GATE 2017 Examination*

Mechanical Engineering

Test Date: 04/02/2017
Test Time: 2:00 PM 5:00 PM
Subject Name: ME MECHANICAL ENGINEERING

Section I General Aptitude

Section II Technical

1. What is the weight percentage of 'C' in Fe_3C , if atomic weight of Fe is 56 and C is 12?

2. In order to make a T-shaped component of maximum strength which of the following manufacturing process should be adopted
   (A) Casting
   (B) Forming
   (C) Machining
   (D) Welding

3. Which of the following statement is TRUE for VSM
   (A) It uses a magneto static transducer
   (B) It is used for ductile materials
   (C) The tool vibrates with sub sonic speed
   (D) It often employs abrasive particles slurry

4. What is the crystal structure of Aluminum?
   (A) BCC
   (B) FCC
   (C) HCP
   (D) SC

5. The heat flow rate through the fin is 6 W. Efficiency is 0.75 and effectiveness of the fin is 3. Find the heat flow rate if the entire fin is maintained at base temperature.

6. In orthogonal machining operation $\propto = 9°$, $t_1 = 0.2$ mm and t_2 varies between 0.25 and 0.4 mm. Find the ratio of maximum shear angle to minimum shear angle?

7. In Rolling operation, diameter of rollers 300 mm, width of rollers, 120 mm velocity of strip at exit = 30 m/min, the average [pressure in deformation on gone = 200 MPa. Considering 100 % efficiency find out the power required to drive both the rollers.

8. A cylindrical pin of diameter $20^{+0.002}_{+0.001}$ mm is electroplated with thickness $2^{+0.005}_{-0.005}$ mm, neglect the gauge tolerance. What is the size of Go-gauge for cylindrical pin?

9. When the spindle rotates at 400 rpm, the tool life obtained is 20 mins, when it rotates at 200 rpm, the tool life obtained is 60 min. Find the tool life if spindle rotates at 300 rpm?

10. Enthalpy at entry and exit of turbine are 2803 and 1800, and at entry and exit of pump121 and 124 kJ/kg. Then specific steam consumption?
[Ans. *] Range: 3.6 to 3.6

11. If a gas contained moisture is heated in metallic tank, then
(A) relative humidity increases
(B) RH decreases
(C) specific humidity increases
(D) SH decreases
[Ans. B]

12. Gauge pressure = 0.5 bar, atm pressure =1 bar V = 0.287 m^3 T = 300 K inside a close vessel, then find mass of air?
[Ans. *] Range: 5 to 5 kg

13. Isothermal expansion (or compression?) from p_1, v_1 to p_2, v_2 - (Consider work done on system is positive)
[Ans. *]
$(-)p_1 \times v_1 \times \ln\left(\frac{p_1}{p_2}\right)$
Negative of usual formula as work done on the system was to be considered positive..

14. Find entropy change when air undergoes a process from p = 1 bar T = 300 K to p = 5 bar T = 300 K
[Ans. *] Range: 46 to 46

15. 1 kg of ideal gas having Cp=1000 J/kg k at P = 1bar T=300 K sealed in a rigid cylinder. The work done on the system adiabatically by using a stirrer. Stirrer work 100 kJ then what is the increase in Entropy of the system?
[Ans. *]

16. In a mixture of air and water vapour total pressure at 30°C is 100 kPa, relative humidity 55%, saturation pressure at 30°C 4.28 ,.mass of water vapour per kg of d.A (in grams).....
[Ans. *] Range: 14.8 to 14.8